**Topics 06 – Kinetics (SL/HL 1)**

**Topic 6: Kinetics (5 hours)**  
**6.1 Rates of reaction - 2 hours**   
6.1.1 Define the term rate of reaction. (1)   
6.1.2 Describe suitable experimental procedures for measuring rates of reactions. (2)   
6.1.3 Analyze data from rate experiments. (3)   
**6.2 Collision theory - 3 hours**   
6.2.1 Describe the kinetic theory in terms of the movement of particles whose average energy is proportional to temperature in kelvins. (2)   
6.2.2 Define the term activation energy, Ea. (1)   
6.2.3 Describe the collision theory. (2)   
6.2.4 Predict and explain, using the collision theory, the qualitative effects of particle size, temperature,   
concentration and pressure on the rate of a reaction. (3)   
6.2.5 Sketch and explain qualitatively the Maxwell–Boltzmann energy distribution curve for a fixed amount of gas at different temperatures and its consequences for changes in reaction rate. (3)   
6.2.6 Describe the effect of a catalyst on a chemical reaction. (2)   
6.2.7 Sketch and explain Maxwell– Boltzmann curves for reactions with and without catalysts. (3)   
  
**Topic 16: Kinetics (6 hours)**  
**16.1 Rate expression - 3 hours**   
16.1.1 Distinguish between the terms rate constant, overall order of reaction and order of reaction with respect to a particular reactant. (2)   
16.1.2 Deduce the rate expression for a reaction from experimental data. (3)   
16.1.3 Solve problems involving the rate expression. (3)   
16.1.4 Sketch, identify and analyze graphical representations for zero-, first- and second-order reactions. (3)   
**16.2 Reaction mechanism - 1 hour**   
16.2.1 Explain that reactions can occur by more than one step and that the slowest step determines the rate of reaction (rate-determining step). (3)   
16.2.2 Describe the relationship between reaction mechanism, order of reaction and rate-determining step. (2)   
**16.3 Activation energy - 2 hours**   
16.3.1 Describe qualitatively the relationship between the rate constant (k) and temperature (T). (2)   
16.3.2 Determine activation energy (Ea) values from the Arrhenius equation by a graphical method. (3)